REMARKS

Applicant's undersigned counsel thanks Examiner Jolley for her continued thorough examination of the present application.

Herein, claim 1 has been amended to incorporate, in the alternative, the substantive limitations of claims 3 and 4, which dependent claims have now been canceled. Claim 11 has also been canceled in view of the amendments to claim 1. No new matter has been entered.

Claim 1 continues to be rejected under 35 USC § 102(b)/103(a) as being either anticipated by or obvious over Shirley. In the prior Office action dated March 16, 2007, the Examiner set forth two bases of rejection over Shirley. The first was that while Shirley "most often" uses the chill plate assembly 20 to heat or cool the substrate itself prior to liquid coating, the Examiner argued, the chill plate assembly 20 *also* can be used to condition the substrate after coating a "primer" thereon. In making this rejection, the Examiner likened this "primer" to the viscous liquid referred to in claim 1. In the recent Office action, however, the Examiner has now acknowledged that the "primer" in Shirley is not necessarily in the form of a liquid. Consequently, the Examiner appears to have tacitly withdrawn the first basis of rejection over Shirley mentioned above. Nevertheless, it was stated that "the Examiner maintains the second position taken – that it would have been obvious to have incorporated the features of the chill plate into the coater bowl assembly as stated in col. 5, lines 10-15, and as discussed in the final Office action." Office action, p. 3.

This "second position" or second basis of rejection was fully addressed in the Amendment Under Rule 1.116 that was filed July 10, 2007, which was subsequently entered on filing an RCE. Nonetheless, the Examiner continues in her position that the orifices 55b (and associated manifolds 54b, heat exchangers, etc.) in the coater bowl assembly 30 can be located *above* the substrate instead of below it, citing col. 10 lns. 10-14 to support this proposed modification. The entire paragraph from Shirley containing that passage, and the one before it, are reproduced below:

> The bowl temperature controller 50b is coupled to the coater bowl assembly 30 to transfer heat to or away from the substrate 70 as the substrate 70 rotates relative to the coater bowl 31. *In one embodiment, the temperature controller 50b includes a fluid supply 51b coupled to a single heat exchanger 52b which is in turn coupled with a conduit 53b to a single manifold 54b. The manifold 54b includes a plurality of orifices 55b disposed in a concentric, annular arrangement* about the rotatable chuck 32 to transfer heat to or from the substrate 70.

> The heat transferred to or from the substrate 70 can be controlled by adjusting the flow rate through each of the orifices 55b. For example, the orifices 55b toward the periphery of the substrate 70 can be smaller than those toward the center of the substrate 70 to reduce the rate of heat transfer to or from the periphery of the substrate 70. Alternatively, each of the orifices 55a can have a variable diameter that can be adjusted manually or via an actuator to direct the flow at a selected flow rate through each orifice 55a. *In another embodiment, the bowl temperature controller 50b can include a plurality of heat exchangers 52b and manifolds 54b, arranged in a manner generally similar to that discussed above with reference to the plate temperature controller 50a.*

Shirley, col. 4 ln. 58 to col. 5 ln. 14.

The second emphasized portion above is the passage cited by the Examiner. The Examiner has reiterated her view that this passage "indicates that any of the discussed features of the plate temperature controller 50a, including ***the location*** of the manifold, orifices, etc., may be incorporated into the bowl temperature controller 50b." Office action, p. 3 (emphasis supplied). To the contrary, applicants have previously argued that all this passage states, when properly taken in context of the entire paragraph where it is found and the paragraph before, is that instead of a ***single*** heat exchanger and a ***single*** manifold as described in the preceding paragraph, "a ***plurality*** of heat exchangers" and a "***plurality*** of manifolds," arranged similarly as in the chill plate assembly 20, can be used. Applicants maintain this is the fair and appropriate meaning to be gleaned from the passage cited by the Examiner (second emphasized portion quoted above). Nothing in Shirley indicates that the *location* of the manifold(s) and orifice(s) can be moved from below the substrate in the coater bowl assembly 30 to above the substrate.

To further evidence this fact, applicants previously pointed out that the *location* of these elements cannot be shifted to above the coater bowl assembly 30 because at least the central nozzle/manifold 53a from the chill plate assembly 20 would interfere with or displace the liquid nozzle 35, which is centrally located above the substrate in the coater bowl assembly 30 (see Fig. 1). Acknowledging this point, the Examiner stated in the last Office action that "an engineer having ordinary skill in the art would recognize that some adjustments to the design would be required when incorporating the alternative suggested embodiments, and an engineer would be capable of designing a bowl controller that incorporates the alternative suggested embodiments." Office action, p. 4. Respectfully, however, the liquid nozzle 35 in Shirley cannot be readily moved (or "adjusted") as the Examiner suggests, because this would result in non-uniform

coverage of the liquid on the spinning substrate. That is, the liquid is spread through application of centrifugal forces as the substrate spins, causing the liquid to spread radially out from the center. If that liquid were applied at a location other than the geometric center of the substrate, then the centrifugal forces would cause that liquid to spread unevenly as opposed to uniformly out from the geometric center. Moreover, the controlled temperature gradients to regulate local viscosity would be ineffective because those are *radial* gradients applied in the substrate, with each discrete temperature point provided either at the center or in an annular ring that is concentric with the center of the substrate. If the liquid were deposited other than at the geometric center of the substrate, (because the central nozzle/manifold 53a would now displace the liquid nozzle 35), then a *radial* temperature gradient in the substrate would be ineffective to uniformly regulate the *radial* spreading of the applied liquid.

In Shirley it is important to provide a uniform *radial* temperature gradient, from the center (based on nozzle/manifold 53a) outward to nozzles/manifolds 55a/54a (see Fig. 1). While it may be 'possible' to reconstruct Shirley's structure to enable providing a radially uniform temperature gradient (beginning at the center) using manifold structure *and* to permit central application of the liquid using a modified nozzle 35, Shirley certainly does not teach one how to achieve this or render obvious how to do so. The Examiner's 'an engineer could do it' argument appears to be an attempt to justify the hindsight reconstruction of Shirley to match the claimed invention, which is not permitted. Indeed, a large majority of new inventions, if not nearly all of them, *could* be prepared by significantly modifying an existing device to incorporate the new features that are claimed. But whether this *could* be done is not the test for invention; nor is this an appropriate test for whether a claim is obvious. Instead, the appropriate inquiry is whether the references, taken alone or in combination with other references, generally available information or knowledge, or even the nature of the problem to be solved itself, would have rendered the claimed invention obvious at the time the invention was made.

The Examiner has not articulated a reason why Shirley would so render the claimed structure obvious. It is acknowledged that a skilled engineer *with reason to do so* might be able to disassemble and reconstruct Shirley's device in a different way that may fall within the scope of applicants' claim 1. It is this reason to do so that is missing from the Examiner's argument. Such a reason is particularly important since the one modification the Examiner has suggested to render claim 1 obvious (transfer the *location* of the manifold from below the substrate to above it in the coater bowl assembly 30) would require additional substantial modifications (relocation of

the liquid nozzle 35 without affecting where the liquid is deposited onto the substrate) that are never referred to or even hinted at in Shirley. Simply stated, a person of ordinary skill in the art, starting from Shirley and without the applicant's invention in view, would have had no reason to relocate the manifold from below the substrate in the coater bowl assembly 30 to above it. Nor would that have been an obvious thing to do at least because doing so would interfere with the liquid conduit 34 and nozzle 35 for delivering liquid centrally to the surface of the substrate 70.

The Examiner is respectfully requested to review and reconsider the claim rejections over Shirley in view of the arguments already of record and in further view of the additional arguments set forth above.

Claim 1 has also been rejected under 35 USC § 103(a) over Kim in view of Thakur. In claim 1, thermal conditioning is effected by a thermal source of heat or cold placed above the surface of the substrate to create a locally selective temperature gradient. Neither Kim nor Thakur discloses this arrangement. In Kim, temperature control is effected from underneath the substrate. Regarding Thakur, while this reference does disclose lamps 24 and 26 above the substrate, it is clear these lamps would not be effective to induce a "a locally selective temperature gradient" as claimed. Lamps 24, 26 appear to be standard visible-light lamps, as noted by the Examiner (Office action, p. 7), and would flood the substrate with EM energy in an uncontrolled way that would not be effective to generate a "locally selective temperature gradient."

It is true that Thakur discloses as many lamps as necessary may be used, that they may be provided in "any suitable configuration," and that the illustrated locations are "merely exemplary," as the Examiner has noted. However, none of this implies or suggests disposing lamps in a manner that would be effective to produce a "locally selective temperature gradient" as claimed. In fact, it is submitted that using lamps as disclosed in Thakur, this would be impossible. The thermal source(s) in claim 1 locally influence the viscosity of the liquid, such that a desired distribution of that liquid, homogeneous or selectively inhomogeneous, on the substrate surface is achieved. *See* specification, p. 7 lines 17-20. This is the meaning of "creating a locally selective temperature gradient" in claim 1. This clearly is not possible with lamps 24, 26. Nor is such precise temperature-gradient control intended or hinted in Thakur, where the lamps 24, 26 are used simply to "deliver a sufficient amount of energy to the liquid droplets for causing the liquid droplets to vaporize, react, or decompose and transform the parent material into a solid." Thakur, col. 7 lines 49-52. In other words, the lamps 24 and 26 in Thakur

are used to vaporize the atomized droplets sprayed from the nozzle 14, so they may be deposited and then solidify on the substrate surface. Thus, Thakur relies on vapor or dispersed-droplet deposition to achieve a uniform coating, whereas the present invention relies on liquid-phase deposition and then *spreading of a liquid* to achieve that end.

It should be apparent, therefore, that the lamps in Thakur not only are not designed and cannot be adapted to generate the localized temperature gradient claimed in claim 1, but that one would not even consider such a modification because it would be useless in Thakur, where liquid-phase *spreading* does not occur. As to the combination of Thakur and Kim, these are two entirely different processes that are incompatible; one deposits a liquid that must be spread using centrifugal forces and the other relies on uniform surface deposition from atomized droplets. That these are incompatible is evidenced by the foregoing argument. The lamps 24, 26, which may be useful to vaporize atomized droplets that have been uniformly deposited in the liquid phase (or for vapor-phase deposition) on the substrate, would not be effective to generate a localized temperature gradient to effect homogeneous or selective inhomogeneous radial spreading of a liquid-phase material applied at the center of the substrate surface. Moreover, Thakur's process is expressly distinguished from spin coating techniques in the body of that reference. *See* whole patent, *esp.* col. 2, line 57 to col. 3 line 5:

> In the past, in order to form a photoresist coating on a wafer, the photoresist materials have been spin coated onto the substrates.
>
> According to this process, the substrate is first placed on a vacuum chuck and rotated at high speeds. A solution containing the photoresist is then applied to the substrate. Due to centrifugal force, a coating is formed on the substrate which is dried and annealed on a hot plate or in a furnace.
>
> Difficulties, however, have been encountered with this process in getting the photoresist to adhere to the substrate and in producing a film having good physical properties. Such deposition methods usually generates course material with undesirable physical properties. Further, other problems have also been experienced in controlling various parameters, such as the thickness and uniformity of the film especially when applied to larger wafers.

Based on all the above, it would not have been obvious to combine the teachings of Kim and Thakur as the Examiner suggests. For one thing, one *could not* have utilized Thakur's 'from

above' radiation to achieve a locally selective temperature gradient. Second, Thakur expressly distinguishes a liquid-spreading technique (via spincoating) as inferior, and it certainly would not have been obvious to incorporate such a technique into the process using Thakur's lamps 24,26 to mediate radial spreading of a viscous liquid. Even if such a change were contemplated, there could be provided no locally selective temperature gradient as noted above. Accordingly, it is respectfully submitted that the rejection of claim 1 based on Kim and Thakur also has been overcome.

Finally, it is noted that the European Patent Office has issued corresponding Patent No. EP 1 569 759 wherein claim 1 is substantially the same as claim 1 now pending herein. A copy of that European patent is enclosed for the Examiner's reference and convenience.

For all of the above reasons, it is respectfully submitted that claim 1 is now in condition for allowance. All remaining claims are dependent claims, and accordingly are believed to be allowable at least for the same reasons as discussed above for claim 1.

Should the examiner have any questions or reservations regarding the instant submission, or for any other reason to expedite the prosecution of this case, she is invited and requested to please contact the undersigned at the phone number below.

If there are any fees required by this communication that are not mentioned above, then please charge such additional fees to our Deposit Account No. 16-0820, Order No. UNAX1-35194US1.

Respectfully submitted,

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